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AN ACCOUNT

OF A

NEW MINERAL SUBSTANCE,

DISCOVERED AT KILLINEY,

IN THE VICINITY OF DUBLIN.

BY THOMAS TAYLOR, M. D. M. R. I. A. F. L. S.

ALTHOUGH the mineral kingdom in bulk so eminently surpasses the animal or vegetable, yet naturalists have already distinguished the species of each of the latter into some tens of thousands, while those of the former are scarcely made to exceed four hundred in number. Such, then, being the uniformity of mineral substances, the difficulty of assigning to them exclusive characters, whether taken from their composition or external appearance, being also very great, the admission of a mineral to the rank of a new species should be practised with the utmost caution. Conscious of a very limited knowledge of Mineralogy, I should not have ventured to lay before the Royal Irish Academy, the following remarks on a mineral found in the vicinity of Dublin, if I were not supported in considering it a new species by the opinions of some eminent mineralogists, by some obvious marks of distinction in its external characters, and by the results of a chemical analysis.

Having observed on the south-western side of the hill of Killiney, near Dublin, persons engaged in the clearing of land by the operation of blasting large blocks of Granite, I was led through curiosity to examine the broken pieces, in the hopes of meeting with some unusual mineral substance. These expectations were strengthened by the consideration, that these blocks lay in the direction of the remarkable junction of Granite and Mica-slate, which runs from Killiney, through the Scalp, into the county of Wicklow. Here I had the good fortune to meet with the mineral under description, also in considerable abundance some fine specimens of Spodumene, a species so rare, that, if we except the very small pieces of it detected by Sir Charles Gieseckè in Greenland, it has hitherto been found only in one quarry in Sweden. They both occur at Killiney in veins in granite. These veins consist of fine-grained granite, of an inch or two in thickness, having their central parts filled with Spodumene, with the present species, which, from its locality, may be termed Killinite, large irregular pieces of Quartz, imbedded crystals of felspar, and minute garnets.

Killinite occurs imbedded in elongated prisms, the number of whose sides, or the figure of whose terminations is not distinctly observable: in one case, however, the prism indicated the octohedral form. These prisms are frequently rifted across; they intersect one another at various angles. The structure is lamellar; the natural joints cannot be perceived in more than one direction. The lustre is shining, between pearly and silky. It is easily frangible. The fracture is fine grained, uneven, with a dull lustre. Its colour is usually of an olive green tinged with brown and yellow ; sometimes of a light brown and of a pearly lustre. Its powder is of a greyish white colour. It is translucent; yields easily to the knife, though not to the nail; scratches marble, but not crystallized fluor. Its specific gravity is 2.698. When breathed upon, it yields an argillaceous odour distinctly. Before the blow-pipe it quickly loses colour and becomes white, swells, and is changed with but little difficulty into a white enamel. Pieces, which seem to have been exposed to the air for some time, have their surface coated of a dark colour, and present the appearance of holes corroded into them, and lined with a ferruginous dust, no doubt from the decomposition of the Iron contained in this mineral.

In general appearance Killinite seems nearly allied to Serpentine, and has many points of resemblance to Nephrite; from both of these species, however, its fusibility before the blow-pipe, and the chemical analysis, prove it to differ abundantly, as both these contain at least 10 per cent. of lime, an earth of which scarcely an appreciable quantity can be discovered in our mineral. From Serpentine it may be more particularly distinguished by its containing only a trace of Magnesia, which forms 37 parts in the hundred of that mineral. Nephrite, and the varieties of Jade, contain at least 5 parts in the hundred of Soda, a substance not to be found in Killinite. But the species with which there is the greatest reason to apprehend a confusion, is Spodumene, which occurs in the very same vein in which our mineral is found. But Spodumene, besides presenting some differences in the chemical analysis, as the greater proportion of Silex and of Lime, and the absence of any trace of Manganese or Magnesia, may be distinguished, 1st. by the greater specific gravity, which of the specimen from Killiney is 3.06; 2dly, by the structure which presents natural joints in three directions, while these are observable only in one in Killinite; 3dly, by the greater degree of hardness, since it scratches glass; 4thly, by its lighter colour, which is greenish white; and 5thly, by its appearances before the blow-pipe; for before a strong flame Spodumene at first swells, then falls into a whitish powder, and if the flame be urged on small pieces, they are readily converted into transparent glass globules; while Killinite, without presenting the peculiar appearance of ashes before the blow-pipe, (whence the name of Spodumene is derived,) never becomes transparent, but is changed into a white opaque enamel.

The following chemical analysis of Killinite was kindly undertaken and performed by my friend Doctor Barker, Professor of Chemistry in the University. It is unnecessary to state to the members of this Academy, (most of whom well know,) what entire confidence may be placed in his knowledge and accuracy.

Various experiments, instituted for the purpose, indicated the chief constituents of this mineral to be Silex, Alumine, Potash, and oxide of Iron. To ascertain the relative quantity of these substances, different methods were employed. By the action of Sulphuric acid, the quantities of Silex and Potash chiefly were determined. By solution in caustic Potash, and the usual subsequent treatment, the quantity of Alumine was ascertained, and the results obtained by the Sulphuric Acid at the same time confirmed. Another process, in which the chief agent was Nitrate of Barytes, served to establish the presence of Potash, and to guard against error in estimating the quantity of this alkali.

Diluted nitric acid exerted no action on the mineral. One hundred grains of it reduced to fine powder, and heated to redness in a platina dish during half an hour, suffered a loss of weight equal to five grains, arising from the expulsion of *water* (A.)

The remainder was mixed with about three hundred grains of recently distilled Sulphuric Acid, and evaporated to dryness in a vessel of platina. This operation was twice repeated; the resulting dry mass was washed with boiling water, until all the soluble sulphuric compounds had been separated from a gritty white insoluble powder. This was dried and heated to redness. It weighed fifty grains, and had the properties of *Silex.* (B.)

The washings containing the substances dissolved by the Sulphuric acid were evaporated to the consistence of a syrup nearly, and set aside; crystals in the form of the octohedron or its modifications gradually appeared; these, when separated from the liquor, had all the properties of Alum, and when dry weighed 49.75 grs. indicating very nearly 5 grains of *Potash.* (C.)

From the liquor remaining after the separation of the alum crystals, *oxide of Iron* was obtained, which, purified from Alumine by the solvent action of caustic alkali, and dried, amounted to 2.49 grs. (D). This was united with 1.62 grs. of *Silex* (Bb) and the fluid from which the Iron and Silex had been separated by means of subcarbonate of Potash, yielded 0.75 grs. of *black oxide of Manganese* (E), together with 0.87 grs. of *Silex.* (Bc). Traces of *Lime* and *Magnesia,* in combination with *oxide of Iron,* were also observed, which were estimated at 0.50 grs. (F).

By the preceding method the quantity of Alumine was not determined with exactness; for this reason, as well as further to confirm the other results of that analysis, the following process was employed. One hundred grains of the mineral reduced to fine powder, together with three hundred grains of caustic potash, were heated to redness in a silver crucible. The mixture assumed a dark green colour, and afforded, with diluted muriatic acid, a perfect solution of a greenish yellow colour. This, when evaporated sufficiently, and suffered to cool, formed a jelly, and on being again heated was converted into a bright yellow coloured mass, which had its colour destroyed by water, and restored by muriatic acid. With this acid the powder was digested for some time, then well washed with water, carefully collected, dried, and ignited; it then weighed 50.06 grs. and exhibited the properties of *Silex.*

The acid solution, united to the aqueous lixivia, was mixed with a solution of subcarbonate of potash, which caused a powder of a dull orange colour to fall down. This was repeatedly washed; the washings set aside; the residual powder dried, and then boiled in a silver crucible, with successive portions of caustic alkali, until the alkaline liquors ceased to afford any precipitate on the addition of muriate of Ammonia. A powder of a deep brown colour remained undissolved by the alkali. The alkaline washings collected were decomposed by a solution of Muriate of Ammonia, a white powder separated, which, washed carefully, and dried at a red heat, weighed 22.75 grs.; it was *Alumine.* (G). From the liquor remaining after the precipitation of the muriatic solution by subcarbonate of Potash, a brown flocculent powder was collected by means of evaporation, and when dry, appeared of a yellowish white colour; it weighed one grain, and consisted of oxide of Manganese, equal to 0.50 grs. and oxide of Iron united to some Lime, Magnesia and Silex, together equal to 0.50 grs.

The substance mentioned above on which caustic alkali had no action, and of a deep brown colour, formed a partial solution with Muriatic Acid, and there were obtained from it 1.50 grs. of oxide of Iron, 0.37 grs. of Silex, and of *Alumine* united to a minute portion of Lime 0.94 grs. (Ga). The oxide of Iron was obtained from the solution by Succinate of Ammonia, the other ingredients by the usual means. The muriatic liquor formed during the separation of the Alumine from its solution in caustic potash by

Muriate of Ammonia, as already stated, afforded, on evaporation, a brown powder, which consisted of *Alumine* 1 gr. (Gb) and oxide of Iron 0.25 grs.

The mineral was also heated with Nitrate of Barytes, in order to confirm the inference deduced as to the quantity of potash indicated by the Alum crystals in the first process with Sulphuric Acid. Fifty grains of it, in fine powder, were mixed with 250 grs. of powdered Nitrate of Barytes, and heated to redness in a platina crucible, during more than half an hour. To the fused mass, on cooling, diluted muriatic acid was added, which dissolved a part only. The residuum was therefore again treated with 150 grains of Nitrate of Barytes, and the product of this operation dissolved in muriatic acid. The filtered liquor was then decomposed by means of subcarbonate of Ammonia. The fluid was separated by the filter, evaporated to dryness, and the muriate of Ammonia expelled by heat. The dry mass lixiviated with water, and again evaporated, yielded a residuum which had all the characters of muriate of Potash, and when dry weighed 3.50 grs. equivalent to 2.22 grs. of potash, consequently for 100 grs. of the mineral 4.44 of potash.

If we adopt the results of the first process, adding the quantity of Alumine afforded by the second, we shall approximate to the constituents of this mineral, and their respective quantities, with sufficient accuracy for the purposes of scientific arrangement.

The results stand thus:

		grs.	grs.
Water	(A)	5.00	5.00
Silex	(B)	50.00	
Ditto	(Bb)	1.62	
Ditto	(Be)	0.87	52.49
Potash	(C)	5.00	5.00
Oxide of Iron	(D)	2.49	2.49
Oxide of Manganese	(E)	0.75	0.75
Lime and Magnesia with oxide of Iron	(F)	0.50	0.50
Alumine	(G)	22.75	
Ditto	(Ga)	0.94	
Ditto	(Gb)	1	24.69
Loss		9.08	9.08
		100.00	100.00

A tabular view of the characters which distinguish Killinite from substances nearly allied to it.

	Specific gravity.	Fusibility.	Hardness.
Killinite………	2.69	Fusible without intumescence into a white opaque enamel.	Scratches marble, but not crystallised fluor.
Spodumene…..	3.06	Falls into ashes, at length becomes a transparent glass.	Scratches glass.
Scapolite……..	3.68	Fusible with intumescence into a shining white enamel.	Hard as window glass.
Serpentine……	2.20	Infusible.	Yields easily to the knife.
Nephrite…….	2.95	Various.	Scratches glass, though it yields to the knife.

A tabular view of the constituents of Killinite, and of substances nearly allied to it.

	Silex.	Alumine.	Lime.	Magnesia.	Potash.	Soda.	Ox. of Iron.	Ox. of Manganese.	Water.	
Killinite………	50.0	24.69	0.25	0.25	5.0		2 49	0.75	5.0	
Spodumene…	64.4	24.4	3.0		5.0		2.20			Vauquelin.
Scapolite…	45.	33.	17.6		0 5	1.5	0.5	0.5		Laugier.
	53.	15.	13.25	7.0		3.5	2.0	4.5		Simon
Serpentine….	32.	0.5	10 2	37.24			0.6		14.0	Hisinger.
Nephrite….	53 75	1.5	12.75		8.50	10.75	5.0	2 0	2.25	T. Saussure.
	49.0	24.0	10.5	3.75		5.5	6.5			Klaproth's analysis of Saussurite.
	44.0	30.0	4.0		0.25	6.0	12.5	0.5		T. Saussure's analysis of Saussurite.

A reference to the foregoing tables will, I trust, readily shew, that the difference between Killinite and the minerals which most nearly resemble it, are striking and satisfactory.